The Sectoral Solution to Climate Change

Agriculture and Food

AFOLU (Agriculture, Forestry, and Land Use) accounts for 22 per cent of all greenhouse gas emissions. A global shift to climate-resilient, nature-positive, pollution- free and human-centered food systems would not only reduce emissions but would also support the resilience and adaptive capacity of farmers to climate shocks and less predictable growing seasons, as well as and benefit biodiversity. As climate change deepens, global food systems will be under threat from shifting growing seasons and extreme weather events. Ambitious, time-bound and measurable actions that accelerate a sustainable food systems transformation are needed if we are to keep the 1.5°C goal in reach.

Key messages

- Food Systems must deliver on environment, livelihoods and nutrition in a changing climate. Our current global food systems are **failing to deliver affordable, sustainable, nutritious, and healthy food** for all while also failing our planet – they need to be transformed for people, for the environment.
- Food systems are the leading driver of **global biodiversity loss**, are responsible for **a third of greenhouse gas emissions** and are a major source of **air and water pollution**.
- To ensure the world can provide affordable and healthy food to a population estimated to reach 10 billion people by 2050, it is imperative that our food systems **restore and regenerate** rather than degrade land, soil and biodiversity. Policymakers can improve the chances of achieving climate goals and limiting global warming to 1.5°C by committing **to time bound and measurable actions** to transform national food systems.
- Currently, demand side mitigation measures like diets and food loss and waste are widely ignored, but by adding them to national climate plans, policymakers can improve their mitigation and adaptation contributions, by as much as **25 per cent**.
- **In relation to farming practices**, the adoption **of healthy soil practices** such as diverse crop covering, maintaining a living root, and reduced tilling practices can produce multi-beneficial impacts – including increased storage of carbon and improved water holding capacity in the soil, changing production systems to cut methane and residue burning, can further reduce short-lived climate pollutants.
- Reducing food loss and waste is recognized as a **top solution for curtailing GHG emissions.**
- Shifting **consumer behavior,** working collaboratively across value chains, and increasing circularity in food systems to keep food out of landfills will tackle climate change, while saving money, strengthening food security and protecting biodiversity.
- **Reduce food loss and waste**, with better cold chains and diversion of food waste for food and feed, and when not possible to turn it into compost or via anaerobic digestion to energy use.
- **Increase resilience of farmers** and the adaptation of food systems to climate change by enhancing soil health, increasing water retention, and reducing soil erosion, while improving farmer livelihoods by valuing the ecosystem services they provide.
- **Promoting biodiversity and nature friendly practices**, by enhancing and restoring ecosystems and increasing habitat diversity, and improving the quality and reliability of freshwater and reducing nutrient runoff into coastal waters.Food systems are currently **under threat** from climate impacts such as floods, droughts, heatwaves and wildfires; and the unsustainable production models that drive biodiversity loss.
- The transformation of ecosystems into agricultural land and the global reliance on a handful of crops have greatly diminished genetic diversity, rendering **food systems highly vulnerable** to a variety of climate shocks. **Protecting and restoring the world's ecosystems** is obligatory for sustainable food production due to the wide variety of ecosystem services these ecosystems provide, from pollination services to water access.
- **Reliable and location-specific Early Warning System** communication on anticipated weather and climate impacts are imperative to supporting farmers adapt to a changing climate.

Driving shared ambition, identifying and aligning efforts and driving innovation are needed to:

- Shift to a food system which builds **resilience** to geopolitical and climate shocks, mitigates GHG emissions from both supply and demand side measures and restores biodiversity.
- Drive a **global, scalable transition** that aims to incentivize farmers to adopt practices which promote sustainable land management and restoration of degraded soils.
- Momentum gained by the Food Systems Summit and Kunming-Montreal Global Biodiversity Framework can deliver climate benefits.
- The Summit launched bold new action including **117 national food systems pathways**, each of which relies on healthier, more sustainable, and equitable food systems.

Climate change and air pollution increasingly threaten food production and supply, making the challenge of ending hunger and malnutrition more difficult than ever.

- There is a pressing need for increased support to **aid developing countries** in the transition from linear to circular waste systems.
- There are many measures to **reduce methane emissions** intensity from agriculture (particularly livestock) by improving the selection of animal breed, feed, and waste disposal. These measures also improve farmer incomes and increase food production.
- All countries need to make **methane abatement** an integral part of their transition toward sustainable food systems and ensure that appropriate consideration is given to methane in key international initiatives and platforms such as the COP28 Sustainable Food System Declaration.

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Further Reading

UNEP Food Waste Index Report 2024

Enhancing NDCs for Food Systems Recommendations for Decision-Makers

Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions

Collaborative Framework for food systems transformation

Food System impacts on biodiversity loss

Ecosystem-based Adaptation in Agriculture: A Path to Climate-resilient Food Systems

Best Practices for Solid Waste Management: A Guide for Decision-Makers in Developing Countries

International Best Practices Guide for Landfill Gas Energy Projects

Enhancing NDCs: Opportunities in Agriculture

UNEP, FAO & UNDP 2023 guide Rethinking our food systems: A guide for multi-stakeholder collaboration

UNEP & UN-Nutrition. 2023. Nutrition and the environment – Nurturing people, protecting the planet

UNEP, Alliance of Bioversity & CIAT, and WWF, 2021. National and Sub-National FooSystems Multi-Stakeholder Mechanisms: An Assessment of Experiences

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Key data

- In 2021, the number of people affected by hunger rose to **828 million**, increasing by 46 million since 2020 (FAO 2022)
- 33 per cent of the Earth's soils are moderately to highly degraded, and over 90 per cent could become degraded by 2050 (FAO, 2020). The far-reaching implications of soil degradation contribute to the long-term loss of ecosystem function and productivity; currently **40 per cent of land is degraded globally** (UNCCD, 2022).
- Food systems are responsible **for 34 per cent of global GHG emissions** (FAO, 2021), including significant methane and nitrous oxide emissions from agricultural production, and carbon released through agricultural expansion and land use change.
- **Animal agriculture** – occupying **– 78 per cent** of agricultural land globally, represents 16.5 per cent of the GHG emissions linked to agriculture and food - methane (44 per cent of emissions) and nitrous oxide (53 per cent of emissions). (UNEP, 2021)
- Currently, cropping or animal husbandry occupies 50 per cent of the world's land that is not desert. (UNEP, 2021)
- In just 20 years, from 1980 to 2000, **42 million hectares** of tropical forest in Latin America were lost to cattle ranching, while 6 million hectares were lost to palm oil plantations in Southeast Asia. (IPBES, 2019)
- Reducing land-use change and conversion of natural habitats, which could reduce emissions by some **4.6 gigatonnes** of equivalent carbon dioxide, or Gt CO2e, per year. (UNEP, 2020)
- Restoring productive ecosystems is essential to supporting food security. Restoration through agroforestry alone has the potential to increase food security for **1.3 billion people.** (UNEP, 2021)
- Land degradation could reduce global food productivity by 12 per cent, causing food prices to soar by up to 30 per cent by 2040. (UNEP, 2021)
- **19 per cent of food available is wasted** in our homes, supermarkets and restaurants (UNEP, 2024)
- In 2022, **132 kg of food per capita per year was wasted**, of which 79 kg per capita was wasted in households (UNEP, 2024)
- **28% of the world's agricultural area** is used to produce food that is lost or wasted (FAO, 2013).

Action on methane reduction by 2030 can avoid 26 million tons of crop losses per year.

- Agriculture accounts for 42 per cent of all anthropogenic methane emissions. (CCAC, 2024)
- Reducing Short-Lived Climate Pollutants can prevent up to **0.6°C of warming by 2050**, providing the best chance of limiting near-term temperature increase and reducing the risks to food security. (CCAC, 2024)
- We can **halve global crop losses** from these pollutants by 2050 by reducing methane emissions, an ingredient in the formation of tropospheric ozone. This would save between **US$4 to US$33 billion**.(CCAC, 2024)